

## 8.0 Implementation

### 8.1 Introduction

The purpose of this chapter is to recommend an implementation strategy for the addition of general-purpose lanes and high occupancy vehicle (HOV) lanes to Interstate 17 within the study limits.

### 8.2 Recommended Construction Phases

The I-17 traffic forecast report recommends ten basic lanes from SR 101L north to the Carefree Highway alignment, and eight basic lanes from that point north to Black Canyon City. In addition, a High Occupancy Vehicle (HOV) lane should be included in each direction from SR 101L to New River Road.

The TI underpass bridges at Pinnacle Peak Road, Happy Valley Road, and Table Mesa Road will limit widening opportunities to 3+1 at Pinnacle Peak and Happy Valley and 3+0 at Table Mesa. After the bridges are reconstructed with longer spans to allow more lanes to pass beneath, additional mainline lanes can be constructed. Overpass bridges, including I-17 over SR 101L and its frontage roads, Deer Valley Road, Skunk Creek, CAP, Deadman Wash, New River, New River Road, Moore's Gulch, Little Squaw Creek, Agua Fria, and the Black Canyon City TI, will require widening for the addition of lanes. If funding is available, it is recommended that the overpass bridges be widened to ultimate widths in the first phase of construction for each segment.

An ARFC overlay is included for the length of the project.

With the exception of right-of-way, costs were estimated for each phase using current unit prices for all items. The estimate was not adjusted to account for future rising costs. Right-of-way costs assume a 10% yearly real estate appreciation, with acquisition occurring five years from the completion of the study.

#### Phase 1 – 3+1 SR 101L TI to Carefree Highway (Sta 685+00 – 1223+00)

Based on an analysis of projected traffic volumes, the first project should consist of adding one lane in each direction through the I-17/SR 101L TI and two lanes, largely in the median of I-17, in each direction from approximately Rose Garden Lane to Carefree Highway (SR 74). The existing median measures 60 feet from Rose Garden Lane to approximately the CAP canal, where it widens to 76 feet. The typical section in each direction will be 75' wide plus 12' auxiliary lanes: one-foot median barrier, 2-foot offset to barrier, 10-foot inside shoulder, 12-foot HOV lane, 2-foot HOV buffer, three-12-foot lanes, 12-foot outside shoulder, and 12-foot auxiliary lane ( $1+2+10+12+2+3*12+12 = 75' + 12' \text{ aux lanes}$ ). The outside shoulder should be 12' wide to accommodate a future lane.

- It is recommended that all right-of-way for the ultimate widening from Rose Garden Lane to Carefree Highway be acquired in this phase.
- Add auxiliary lanes:
  - Deer Valley TI to Pinnacle Peak TI
  - Pinnacle Peak TI to Happy Valley TI
- Widen bridges over SR 101L and its frontage roads to ultimate widths: 83'-84'.
- The existing Pinnacle Peak TI UP is a 234-foot long, four-span bridge over I-17. The two spans through which the I-17 mainline passes are 67 feet. Because the Pinnacle Peak Road bridge over I-17

is not anticipated to be replaced prior to the initial I-17 widening, the outside shoulder width must be reduced beneath the bridge. A half-section consisting of a one-foot median barrier, 2-foot offset to barrier, 10-foot inside shoulder, 12-foot HOV lane, 2-foot HOV buffer, three-12-foot lanes and a 4-foot outside shoulder would fit beneath the bridge ( $1+2+10+12+2+3*12+4=67'$ ). A Design Exception will be required.

- Widen bridge over Deer Valley to its ultimate width: 101' NB, 113' SB.
- Construct storm drain system Rose Garden Lane to Deer Valley on both sides and Deer Valley to Pinnacle Peak Road on the east side.
- Remove median catch basins for culverts connecting northbound I-17 with southbound I-17 culverts. Those culverts draining only the median will be plugged.
- Extend Scatter Wash culverts.
- With early acquisition of right-of-way, a Scatter Wash detention basin, (sited on the west side of I-17 at approximately Sta 830+00) can be constructed in Phase 1. A larger basin may be constructed at this location to accommodate larger flows and reduce or eliminate the adjacent floodplain. The larger regional basin would be a joint effort between ADOT, the City of Phoenix, and the Flood Control District of Maricopa County.
- Replace 2-8' x 7' Scatter Wash box culvert through Pinnacle Peak road to alleviate ponding in the area.
- 68' spans exist at the Happy Valley TI; a Design Exception for reduced outside shoulder width will be required:  $1+2+10+12+2+3*12+5 = 68'$ .
- Construct drainage channels.
- It is recommended that noise barriers be constructed in early phases of the project, when the ultimate right-of-way width is acquired. In addition to long-term traffic noise mitigation, early construction of the noise barriers will reduce construction noise in the neighborhoods adjacent to I-17.
- Relocate/reconstruct frontage roads between Rose Garden Lane and Pinnacle Peak Road and between Happy Valley Road and Dixileta Drive.
- Median lighting will be installed in this phase.
- Frontage roads will be relocated to align with replaced/widened bridges over Skunk Creek and the CAP in Phase 1 or Phase 4. However, the existing three-lane, two-way west frontage road adjacent to the I-17 & Dynamite subdivision (between Skunk Creek and the CAP) must be converted to a two-lane, one-way frontage road before the proposed noise barrier and the southbound auxiliary lane can be constructed. Although the construction of the noise wall and conversion of the west frontage road to one way is assumed to be part of this phase, these items will depend on the construction of new City of Phoenix interchanges at Jomax, Dixileta, Lone Mountain, Dove Valley and/or Loop 303.
- Arizona Public Service is planning to construct a 230 kV transmission line on the west side of and parallel to I-17 from just south of Happy Valley Road to approximately Lone Mountain Road, where the line will change course and proceed west. The line is expected to be in service by 2008. The precise location of the line has not been determined, but it is expected that the line will be sited adjacent to ADOT's widened right-of-way.

The estimated design and construction cost for this phase is \$145,524,500, including new right-of-way.

### **Phase 2 – 3+1 Carefree Highway to New River TI (Sta 1223+00 – 1645+00)**

The typical section in each direction will be 75' plus a 12' auxiliary lane:  $1+2+10+12+2+3*12+12 = 75' + \text{aux lanes}$ . The outside shoulder should be constructed at 12' wide to accommodate a future lane.

- The I-17/Carefree Highway TI is programmed for reconstruction in 2005 as a separate project.
- It is recommended that all right-of-way for the ultimate widening from Carefree Highway to New River Road be acquired in this phase. The added right-of-way between the Anthem and New River TIs will accommodate drainage channels.
- Modify Pioneer TI median pier/footing in this phase in order to widen in the median. Pioneer abutment modifications (remove abutment foreslopes) will be required in Phase 5.
- Widen Deadman Wash, New River bridges to ultimate width (87.2').
- In this phase, median catch basins will be removed for culverts connecting northbound I-17 with southbound I-17 culverts. Those culverts draining only the median will be plugged.
- There are no impacts to the existing frontage roads between Anthem Way and New River Road. However, right-of-way will be acquired outside the frontage roads to construct drainage channels. Existing roadside channels have capacity to convey flows to cross culverts at this time.
- Auxiliary lanes will be added:
  - Carefree TI to Pioneer TI
  - Pioneer TI to Daisy Mtn TI (originally constructed with Daisy Mountain TI)
  - Daisy Mtn TI to Anthem TI (originally constructed with Daisy Mountain TI)
- Construct landscaping and irrigation.
- Median lighting and FMS will be installed in this phase.

The estimated design and construction cost for this phase is \$93,383,500, including new right-of-way.

### **Phase 3 – 3+0 New River TI to Black Canyon City TI (Sta 1650+00 – 2300+00)**

The typical section in each direction will be 56 feet:  $10+3*12+10 = 56'$ .

- It is recommended that all right-of-way for the ultimate widening from New River Road to the Black Canyon City TI be acquired in this phase. The new right-of-way generally consists of small quantities of land to accommodate the extension of drainage facilities.
- 59' spans exist at the Table Mesa TI; no design exceptions are required.
- Widen bridges at New River Road, Moore's Gulch (widen to outside), Little Squaw Creek (outside), Agua Fria River (inside) to ultimate widths of 73.2' each direction.
- Modify Rock Springs bridges – remove abutment foreslopes.

- There are no impacts to Mud Springs UP.
- Black Canyon City TI OP bridges would require widening from 38' wide to 73.2' wide to accommodate added lanes. It is recommended that the bridges be replaced rather than widened because of functional obsolescence.
- In this phase, culverts under both northbound and southbound I-17 will be extended to accommodate the mainline widening from New River Road TI to Rock Springs Road TI. From the Rock Springs TI to the Black Canyon City TI, culverts under northbound I-17 will be connected to corresponding southbound I-17 culverts. Those culverts draining only the median from the Rock Springs TI to Black Canyon City will be plugged.
- There are no impacts to frontage roads in this section of I-17.
- There are no proposed noise barriers in this segment.
- Roadway lighting will be installed in this phase.

The estimated design and construction cost for this phase is \$105,255,500.

#### **Phase 4 – 4+1 Rose Garden Lane to Carefree Highway**

The typical section in each direction will be 87' plus auxiliary lanes:  $1+2+10+12+2+4*12+12 = 87' + \text{aux lanes}$ . The outside shoulder should be constructed at 12' wide to accommodate a future lane.

- The Pinnacle Peak and Happy Valley TIs must be reconstructed with longer bridge spans to accommodate the 4+1 mainline roadway section. Although not part of this study, \$8 million has been included in the cost estimate for the reconstruction of each TI.
- Widen mainline bridges over Skunk Creek and CAP to their ultimate widths (101'). When the mainline structures at Skunk Creek and CAP are widened to full width, frontage road bridges will be encroached upon by 2' to 5'. Therefore, northbound and southbound frontage road bridges at Skunk Creek and the northbound frontage road bridge at CAP should be replaced in this phase, together with the widening of the southbound frontage road bridge at the CAP.
  - Skunk Creek: Remove and replace frontage road bridges to accommodate the ultimate widened mainline. It is likely that these bridges will be replaced with the I-17/Jomax TI construction project, so the replacement costs are not included in this estimate.
  - CAP: Widen the existing SB frontage road bridge; remove and replace NB frontage road bridge.
- Frontage roads were relocated in Phase 1.
- Install FMS elements.
- The right-of-way for this widening was acquired in Phase 1.
- The noise walls in this segment were constructed in Phase 1.

The estimated design and construction cost for this phase is \$65,400,300.

### **Phase 5 – 4+1 Carefree Highway to New River TI**

The typical section in each direction will be 85 feet plus auxiliary lanes:  $1+2+10+12+2+4*12+10 = 85' + \text{aux lanes}$ .

- The right-of-way for this widening was acquired in Phase 2.
- Modify Pioneer TI abutments.
- There are no impacts to frontage roads in this section.
- No noise barriers are required in this segment.

The estimated design and construction cost for this phase is \$8,662,200.

### **Phase 6 – 4+0 New River TI to Black Canyon City TI**

The typical section in each direction will be 68 feet:  $10+4*12+10 = 68'$

- The right-of-way for this widening was acquired in Phase 3.
- Reconstruct the Table Mesa TI in this phase.
- The bridge structures in this segment were widened or replaced in Phase 3.
- There are no impacts to frontage roads in this segment.

The estimated design and construction cost for this phase is \$31,569,600.

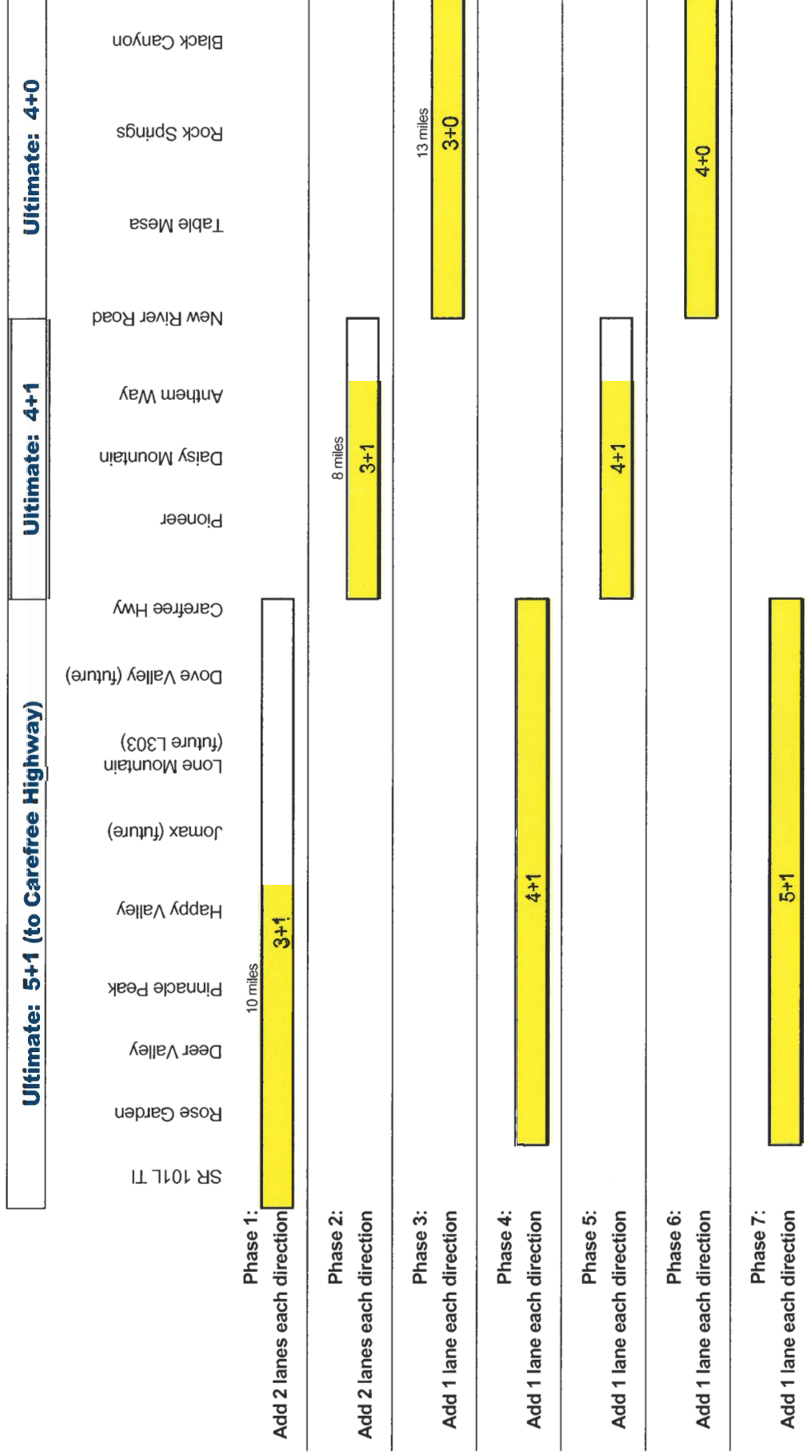
### **Phase 7 – 5+1 Rose Garden Lane to Carefree Highway/Future Loop 303**

The typical section in each direction will be 97 feet plus auxiliary lanes:  $1+2+10+12+2+5*12+10 = 97' + \text{aux lanes}$ . If funding allows, it is recommended that this work be constructed with phase 4 to minimize impacts to traffic.

- Pave 10' outside shoulder. Previous phases added 12' outside shoulder to provide correct jointing for the ultimate 12' outside lane.
- The right-of-way for this widening was acquired in Phase 1.
- Drainage improvements were completed in earlier phases.
- There are no impacts to frontage roads in this phase.
- Construct landscaping and irrigation.
- Noise barriers in this segment were constructed in Phase 1.

The estimated cost for design and construction for this phase is \$7,300,200.

FIGURE 25 – RECOMMENDED CONSTRUCTION PACKAGES



### 8.3 Project Timing

Using peak hour volumes, traffic forecasts indicate that I-17 traffic will operate at LOS D from SR 101L to Carefree Highway if additional lanes are not constructed by 2008. Several sections currently operate at LOS D.

A rural recreational (design hourly volume) analysis indicates that traffic will operate at LOS D by 2003 up to Black Canyon City if additional lanes are not constructed. The addition of one lane in each direction improves the LOS to C through 2011.

ADOT's Five-Year Transportation Facilities Construction Program for the Fiscal Years 2004-2008 includes partial funding for the design and construction of Phase 1. The Program includes funding for projects in this section of the corridor as follows:

**TABLE 26 – CURRENT I-17 PROGRAMMING**

Beginning MP	Location	Type of Work	Funding Source	Funding Amount (\$000)	Fiscal Year
215.0	SR 101L – SR 74	Design road widening	NH	5,000	2006
215.0	SR 101L – SR 74	Widen roadway / HOV lanes	NH	26,560	2008
215.9	Deer Valley Rd TI	Add 2 <sup>nd</sup> WB left turn lane, widen approaches to increase storage in both directions	CM	1,061	2005
215.9	Deer Valley Rd TI	Add 2 <sup>nd</sup> WB left turn lane, widen approaches to increase storage in both directions	MAG/STP	850	2005
224.0	SR 74 TI, Carefree Highway	Reconstruct TI	IM	8,200	2005

### 8.4 Agency Coordination

A number of other studies and construction projects are underway in the corridor. A brief description of each project and its status are reflected in the following table:

**TABLE 27 – PLANNED PROJECTS**

PROJECT	STATUS/COMMENT
ADOT pavement preservation project – from Deer Valley Road to CAP	Project Assessment underway; construction currently planned for FY 2006.
USAA – NE Quadrant I-17/ Happy Valley Rd.	Employment Center/ Insurance: 15,000 employees projected by 2025. Construction underway.
APS 230 kV transmission line on west side of I-17 from Happy Valley Road to Lone Mountain Road.	Line activation by 2008. Anticipated line location adjacent to I-17 widened R/W.
Jomax Road	New TI to be constructed by City of Phoenix. Anticipated construction 2006.
Frontage Roads	City of Phoenix to design and construct one-way frontage roads Pinnacle Peak to Happy Valley and Dixileta to SR 74/Carefree Highway.
New TIs on I-17 in vicinity of Dixileta, Dove Valley, and Lone Mountain.	City of Phoenix to study alignments.

PROJECT	STATUS/COMMENT
Loop 303 to interchange with I-17 north of Happy Valley Road.	Study has recommended Lone Mountain Road alignment for Loop 303.
Carefree Highway TI	TI to be reconstructed in FY 05.
Frontage Roads	Maricopa County planning frontage road improvements Carefree Highway to New River TI.
Tramonto – NE Quadrant I-17/ Carefree Hwy.	Residential Development. Construction underway.
New Daisy Mountain TI (near Deadman Wash)	Construction complete 11/03.
Auxiliary Lanes – Pioneer Rd. TI to Daisy Mtn. TI and Daisy Mtn. TI to Anthem TI	Construction complete 11/03.
Vestar - Happy Valley Towne Center	Construction Scheduled to be completed 12/04
Commercial and residential development	Miscellaneous – planning/construction.

## 8.5 Conclusion

The following implementation strategy is recommended for the addition of lanes to Interstate 17:

- Phase 1 – 3+1 from SR 101L to SR 74/Carefree Highway: \$145,524,500, including design engineering and right-of-way.
- Phase 2 – 3+1 from SR 74/Carefree Highway to New River TI: \$93,383,500, including design engineering and right-of-way.
- Phase 3 – 3+0 from New River TI to Black Canyon City TI: \$105,255,500, including design engineering and right-of-way.
- Phase 4 – 4+1 from Rose Garden Lane to SR 74/Carefree Highway: \$65,400,300, including design engineering.
- Phase 5 – 4+1 from Carefree Highway to New River TI: \$8,662,200, including design engineering.
- Phase 6 – 4+0 from New River TI to Black Canyon City TI: \$31,569,600, including design engineering.
- Phase 7 – 5+1 from Rose Garden Lane to Carefree Highway: \$7,300,200, including design engineering.